

in mind that the heat appliance which works successfully and economically with one form of fuel may not be adapted in any way to the use of another form of fuel, unless extensive alterations are made. There are great differences, not only in the amount of heat released by different fuels, but in the temperatures obtained by the different fuels. For instance, Table 22 compares several gases, arranged in the order of the temperatures obtained through their combustion with the theoretical air supply. It is interesting to note that blue water gas comes first with a thermal value of less than one-third that of natural gas, which comes third in calorific intensity. Another interesting fact is that with 80 per cent excess air, natural gas and a good producer gas are very nearly on par. This tabulation also shows the number of volumes of air supply, products of combustion and combustible mixture. The gas cannot burn unless it has an opportunity to combine with oxygen and it is the thoroughness of the mixing which governs the length of the flame and its temperature. With too long a flame and without good mixing, the temperature realized may be very much lower than the potential temperature of the gas.

The working base necessary for the computation of any of these curves is a complete analysis of the fuel, either by weight or by volume. When the proportions are given by weight, each unit per cent is taken as 10 grams or 10 ounces and divided by the molecular weight to obtain the molecular proportions. Volumetric values may be considered as gram molecules or ounce molecules or as cubic feet or cubic meters. As the chemical equation of any substance fixes the relative weights of the substances and the relative volume when in the gaseous state as well as the amount of heat released or absorbed in a reaction, basing the computations on the molecular

composition simplifies
the work of computation by eliminating a number
of clumsy
conversion factors.

A further advantage of using molecular units
arises from the
following facts:

When the weight is in grams the volume is 22.32
liters

When the weight is in kilograms the volume is
.....22.32 m³

When the weight is in ounces the volume is 22.32
cu ft

Another short cut is the assumption that the
air consists of
1 volume of oxygen and 4 volumes of nitrogen,
making 5 volumes